

Young Stars Near Earth: Progress and Prospects
ASP Conference Series, Vol. ???, 2001
Ray Jayawardhana and Thomas Greene, eds.

A search for nearby young stars among the flare stars

Brigitte König

Ralph Neuhäuser

*MPI für extraterrestrische Physik, Giessenbachstraße 1, D-85740
 Garching, Germany*

Valeri Hambaryan

*Astrophysikalisches Institut Potsdam, An der Sternwarte 16, D-14482
 Potsdam, Germany*

Abstract. Flare stars were discovered in the late 1940s in the solar vicinity and were named UV Cet-type variables (classical FSs). Among the FSs within 100 pc we search for young stars. For the search we take spectra with sufficient resolution to resolve Lithium at 6707 Å and Calcium at 6718 Å of all the stars. The real young stars are prime targets for the search of extra-solar planets by direct imaging.

1. Introduction

According to the recent definition given by Gershberg et al. (1999), these stars are on the lower part of the MS and show activity similar to the sun (sporadic flares, dark spots, variable emission from the chromosphere and the corona, radio, X-ray and UV outbursts).

The UV Cet-type stars are relatively young (possibly zero-age or pre-MS stars) with ages ~ 100 Myrs or younger. They may be former members of recently dispersed T or OB associations or may be ejected stars from associations by a three body encounter (like run-away T Tauri stars). A local dispersed association does not appear unlikely: The translucent high-latitude cloud MBM 12 with ongoing star formation is located at ~ 65 pc (Hearty et al. 2000) and the TW Hya association at ~ 55 pc, which has dispersed its gas and dust (Webb et al. 1999) are already known. Hence, there are indeed young T associations within ~ 100 pc. A few isolated young nearby stars are also known, e.g. GJ 182 at 27 pc and 20 Myrs.

2. The observations and first results

We observe all these stars with FOCES and FEROS, the high resolution echelle spectrograph of the Calar Alto Observatory in Spain and at ESO La Silla Observatory in Chile, respectively. A first reduction of the spectra of some stars shows the existence of strong Lithium absorption line at 6708 Å. As an example,

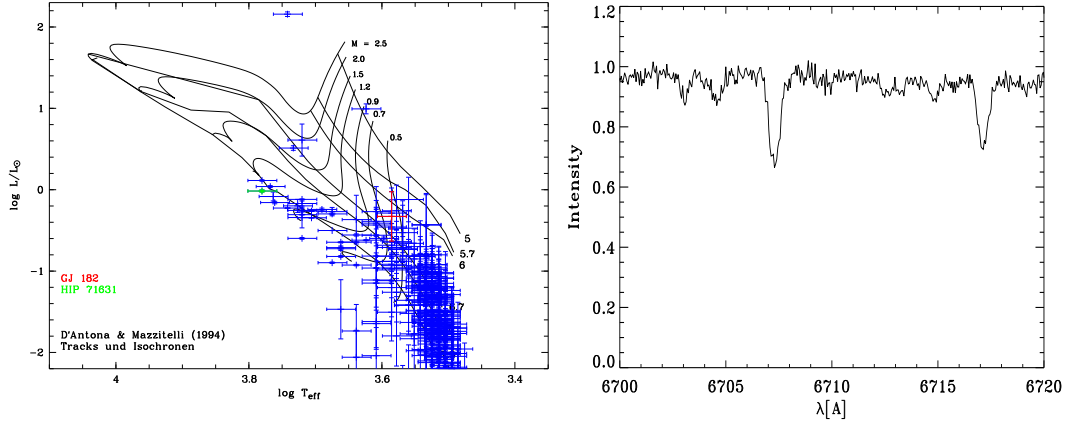


Figure 1. Left: D’Antona & Mazzitelli (1994) tracks and isochrones together with all the stars of the sample. Right: An example for a high resolution spectrum of the star HIP 71531 where we found Lithium at 6708 Å stronger than Calcium at 6718 Å.

HIP 71631 shows strong Lithium absorption at 6707 Å with $W_\lambda(\text{Li}) = 0.213 \text{ Å}$, stronger than Calcium at 6718 Å. This star has been classified as G0.Ve. The parallax given by HIPPARCOS measurement is $29.46 \pm 0.61 \text{ mas}$ which corresponds to a distance of $33.9 \pm 0.7 \text{ pc}$. The V-magnitude is $7.613 \pm 0.011 \text{ mag}$. According to the HR-diagram and the D’Antona & Mazzitelli (1994) tracks and isochrones the star has $1.1 \pm 0.1 M_\odot$ and an age of $5 \pm 2.4 \cdot 10^7 \text{ years}$.

3. Future work

The high resolution echelle spectra enables us to study the stellar properties of the stars in detail. Especially we can measure radial velocity, temperature, metallicity, gravity and rotational velocity ($v \sin i$) to distinguish between pre-MS-dwarfs and Post-MS-giants. Stars in the sample which appear young will be proposed for VLBI observations to spatially resolve possible coronal loops and they are prime targets for direct imaging of extra-solar planets in the IR.

References

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